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the iron was devoid of any thing like a crust. I would repeat that the iron was found in October, 1883, in two masses aggregating at least twenty-five pounds in weight, and that both these masses were covered with a crust. I presented an analysis of the iron made by Mr. James B. Mackintosh of the School of mines, New York, and also cuts showing two views of the iron, and one of the crystalline structure of its surfaces. The iron which I described is unquestionably that mentioned by the writer in your last issue.

Instead of being found near Greenbrier county, it was found two counties farther off, or one hundred miles. Hence it is scarcely credible that all these pieces are fragments of a meteorite which burst in mid-air.

It is exceedingly important in the study of meteorites that wrong localities should not creep into print. If this instance were allowed to pass unnoticed, it would result in the recording of two distinct falls; i.e., one at Charleston, Kanawha county, W.Va., and the other at Jenny's Creek, Wayne county, W.Va. The two small pieces brought to me from Wayne county are identical with the original piece loaned to me for description, and the danger of meeting with these remaining fragments as supposed new finds was touched upon in the paper read at the Academy of sciences. GEORGE F. KUNZ.

A national university.

In No. 149 of *Science* (Dec. 11), in an article on 'A national university,' is a criticism upon that part of the report of Secretary Lamar recommending the establishment of a national university in Washington. The writer urges that there must be "a fatal defect in any congressional bill to establish a university, so long as the principles of appointment to United States offices, and the tenure of those offices, remain what they are." The writer is ignorant of the fact that we now have established in Washington, by congressional bill, the Columbia institution for the deaf and dumb and the Howard university. Both of these institutions, in their present form, were established by congress, and are supported by yearly appropriations. No greater degree of permanence in tenure of office is found in any university of the country than in these, and no difficulty is experienced in finding competent and able professors and instructors.

The next objection is, that "the government of a national university would necessarily be in the hands of some board of officers, and the constitution of such a board would lead to many difficulties."

We supposed that all universities were in the control of some board, and in almost every one of our large universities the constitution of such a board has led to many difficulties: the board of Yale college is now no exception. The Smithsonian institution is controlled by a board of officers appointed by congress, and it has not led to the difficulties suggested. The influence of sectional feeling has not been felt, and we doubt if any plan could have been devised by which more good could have been accomplished than has been by the board of the Smithsonian, with Professors Henry and Baird as its secretaries.

The writer objects that "the gift of such an education would rest in the hands of the members of congress, and would only place so much injurious patronage at their disposal."

There would be no necessity for any thing of this

kind. Such patronage does not exist either in the Columbia institution or the Howard university; but, even if it should rest in the members of congress, the results in analogous cases prove that the objection has no weight. The appointments both to West Point and the Naval school at Annapolis are in the gift of the members of congress, and there are no institutions of the kind in the world where abler men or better scholars have been graduated. These institutions have educated and trained commanders of the army and navy, and they have in war and in peace shown the excellence of their education.

The last objection is, that a national university would be un-American in principles. Washington, Jefferson, Madison, and Adams thought a national university was necessary. We do not understand how an institution which the founders of our country recommended can be considered un-American.

There is no place in the country which possesses such advantages for a national university as Washington. Here are the Smithsonian institution with its various departments, the geological survey, the coast survey, the nautical almanac, the hydrographic office, the signal-service bureau, the national museum, the medical museum, the patent office, the libraries in the various departments, and the congressional library,—each of these bureaus presided over by gentlemen of the highest ability, aided by a corps of men the equals of those of any of our universities; the whole forming a nucleus for a university, when grouped together and combined, superior to any in the world. Washington is the capital of the country, and is to-day a centre of more scientific apparatus and more scientific men than any other city in the union. G. G. H.

It is perhaps unnecessary to point out the difference between a 'national university' and a university incorporated by act of congress.

I think the writer of the above letter must be unaware that the absolute permanence of tenure of office during efficiency is the one great inducement which leads young men of good parts to enter the service of such a college as Harvard. It goes without saying, that it would be out of the question to induce one of the full professors at Harvard, except for much larger pay, to give up his reasonable salary, his position for life, and his comparative freedom from the necessity of explaining his work to unsympathetic critics, to accept a position under the United States government, where he could, by constitutional provision, only be sure of his salary and place from year to year; whereas I know of the anxiety felt by instructors in colleges under city control to escape from their bondage to the politician.

It is true that there are a large number of scientific men in government employ, but they are there for the simple reason that there is the one great market for their services. It has never been my fortune to meet with any teacher who would not prefer to be in the employ of a private school or college, rather than in that of city, state, or United States. The constant parleying with politicians which government employ entails is simply unbearable for many of the men, whose disposition leads them to choose the teacher's life.

The scientific bureaus were established by the United States with the view of making surveys of the country, and the work of scientific investigation is carried on at present only with the object of mak-

ing such surveys possible. It is a step in a radically new direction to introduce the prosecution of investigation *per se*; and it should be well considered where this begins, and whether it is the proper function of the government to prosecute such work. The establishment of a teaching university is a still greater step.

There is further, in my opinion, no need of a university in Washington, as we already have as good an institution as could be wished at the neighboring city of Baltimore.

An appeal to the prestige of the names of the statesmen of the early days of the country is always to be deprecated. We are suffering at the present time from a law passed under the hurrah raised by a similar appeal.

L. S.

Some points in the evolution of the horses.

The main facts with regard to the evolution of the horses have long been known, and the series of modifications in the limbs, skull, and molar teeth, so fully described, that little doubt remains as to the various links in the long chain. But, in tracing out the line of descent of any group of organisms, it is not only necessary to follow out the steps of progression in a general way, but in all their details. In the case of fossils, this must, for the most part, be done by many different observers, as so much depends upon the fortunate discovery of good specimens. The present note gives a small contribution of this kind to the elucidation of the history of the horses.

The earliest member of the series of which we know much is the *Hyracotherium* of Owen (*Orohippus*, Marsh). This little animal is quite abundant in the lower eocene of Wyoming, and has been very fully described by Professor Cope. In this genus (fig. 1) the incisors are arranged in a semicircle,



FIG. 1.—Lower incisor and canine series of *Hyracotherium* (after Cope). One-half natural size.

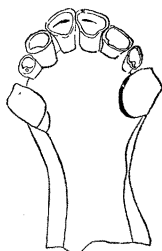


FIG. 2.—Lower incisor and canine series of *Anchitherium* (after Kowalewsky).

either uninterruptedly or separated by slight intervals. They are simple teeth, with sharp, chisel-shaped crowns. The canines are small, conical, and everted. The symphysis of the lower jaw is long and much contracted, rounded and somewhat expanded at the end.

The next type in the series is the *Meshippus* of Professor Marsh, from the White River beds or lower miocene. Although the characters which Professor Marsh gives as separating this form from *Anchitherium* are either inaccurate or not of generic value, *Meshippus* must, as we shall presently see, be regarded as a distinct genus. Here the shape of the mandibular symphysis and of the incisor teeth is very much as in *Hyracotherium*. The incisors are small, with

rather broad, chisel-shaped crowns, and without a trace of an invagination of the enamel. The advance from *Hyracotherium* to *Meshippus* consists chiefly in the increased size of the animal, reduction of the number of digits, greater complexity of the premolar and molar teeth, and enlargement of the brain. Specimens of *Meshippus* with the incisors in position are rather rare. The description given above is of a small species (No. 10,246 of the Princeton museum) which was obtained by the Princeton scientific expedition of 1878 at Chalk Bluffs, Colorado.

In the upper miocene deposits of the Pacific coast the true *Anchitherium* (*Miohippus*, Marsh) appears. In this genus the incisors show an invagination of enamel on the grinding surface of the crown. The pit so formed is shallow, and comparatively soon wears down to a scar. I have not had an opportunity of examining European specimens with reference to this point, but the presence of the pit is clearly shown in Kowalewsky's figures (*Memoires de l'Academie imper. de St. Petersbourg*, 7th ser. tome xx. pl. iii. figs. 55 and 57). Of fig. 57 (see fig. 2), Kowalewsky says, "Les incisives moyennes présentent déjà les puits en émail qui sont si caractéristiques pour les chevaux." This pit, seen in its earliest stages in *Anchitherium*, goes on increasing until it reaches its greatest development in the recent genus *Equus*. It is of interest to see that even in this small and comparatively unimportant detail we find a fresh confirmation of the accuracy of previously expressed views as to the series of equine ancestors. If these determinations are accurate, they must, of course, hold good down to the minutest details. Further investigation will undoubtedly bring more of these minor correspondences to light.

W. B. SCOTT.

Geol. mus., Princeton, N.J., Dec. 16.

Equatorial currents in star and planetary atmospheres.

In the 'Astronomical notes' contained in the number of *Science* for Dec. 11, occurs a statement in regard to the circulation of the earth's atmosphere which seems to me to require qualification, and I therefore venture to call your attention to it. The passage in question reads as follows: "As to the earth, we know that the general drift of the lower atmospheric currents is eastward, rotating faster than the globe itself; but of the circulation high up above the clouds we knew absolutely nothing until the red sunsets following the Krakatoa outburst . . . indicated, by their successive appearances at different places, a probable upper equatorial current moving rapidly westward, i.e., rotating slower than the earth."

Now, it is well known that the eastward movement of the atmosphere is confined to the temperate zones, and is not observable in the polar or tropical regions. On the contrary, the most striking feature in the circulation of the atmospheres is the great equatorial wind-current which flows from east to west along the equator, and is felt beyond the tropics of Capricorn and Cancer. It is about 60° in width, and therefore covers one-half the earth's surface. It is also, as I believe, the most important factor in the whole system of oceanic and atmospheric circulation, since, by the friction of its movement over the ocean surface, it produces the great equatorial water-current which is the chief, though not the only, cause of all the great movements of oceanic waters. The